

## Secondary education and HIV infection in Botswana



There is a strong relationship between socioeconomic factors and health outcomes. These links are so well established that there is very little debate among researchers about their existence. However, there are a couple of important exceptions, including the link between education and HIV. In 2002, a systematic review of studies found that education was either not associated or was positively associated with HIV status, suggesting that more education might actually increase exposure to the virus.<sup>1</sup> A much larger 2008 review found that, although education and HIV were positively associated in earlier years, the disease burden now disproportionately falls on the less educated.<sup>2</sup> This finding is in line with a study from Uganda in which the authors reported that more educated girls were better able to take steps, such as using condoms, to protect themselves against infection.<sup>3</sup> Although many of these studies report important correlations, to be able to say that increased education actually protects against HIV infection, investigators should also attempt to show a causal relation. However, education is also correlated with a host of other factors such as family background, income, and geography and so moving from correlation to causal statements has been challenging.

Randomised controlled trials of educational interventions have also reported evidence to support the view that increased education is likely to be protective against infection.<sup>4,5</sup> However, most education-focused trials are not designed to detect low-probability events such as HIV or to study the cumulative effect of education on HIV infection after students leave school—an important period in which exposure is also likely to occur. The next-best option is to look for natural experiments that have led to changes in education that are unrelated to other factors likely to affect HIV status, which can then be evaluated using rigorous econometric methods, such as instrumental variables or regression discontinuity. The latter approach, which so far has been relatively underused in health and medical research, is particularly appealing to identify rule-based or age-based policy changes in the real world.<sup>6</sup> However, examples such as these are rare in low-income countries, either because few policies are adopted or because they are so poorly implemented that they do not lead to any real change. A recent study from Zimbabwe

that used such a methodological approach found that maternal education was positively associated with more knowledge of HIV status and the preventive behaviours needed to reduce infection risk.<sup>7</sup> However, owing to a lack of statistical power, the authors were unable to identify the effect of education on HIV status.

In *The Lancet Global Health*, Jan-Walter De Neve and colleagues<sup>8</sup> present exciting results from an important study of the effect of a policy change that increased access to education among junior high school students in Botswana in 1996. The policy change led to an average increase of 0.8 years of schooling among teenagers who were just young enough to benefit from this policy. Using age-specific exposure to the policy as an instrumental variable, De Neve and colleagues identified increases in education that were unlikely to be correlated with other factors that also affect HIV status and then showed that individuals who gained an additional year of schooling due to the policy were 8.1 percentage points ( $p=0.008$ ) less likely to test positive for HIV about a decade later, when most of those exposed to the policy were then in their mid-20s. Hence, De Neve and colleagues provide strong and convincing evidence that increased education in Botswana was protective against HIV infection among young adults and is even cost effective by most standards. Their results were strongest among women (11.6 percentage points per extra year,  $p=0.046$ ), which is especially important given the worldwide inequities in access to secondary schooling for girls, especially in Africa.

Although this study provides important new insights into this important global health issue, it has a few limitations. First, the results are generalisable only to individuals who were surveyed and provided a blood sample, which could be undermined if there were important rates of mortality or migration or if education was associated with completing the survey or consenting to an HIV test. Second, the study was also not able to identify effect of education on risk of HIV infection for the entire lifetime. Irrespective of these considerations, increasing access to education in low-income countries should be an important priority because of the proven economic returns to such investments. The health returns from education, such as its potential role in HIV and child mortality (Grépin KA

Published Online  
June 29, 2015  
[http://dx.doi.org/10.1016/S2214-109X\(15\)00050-9](http://dx.doi.org/10.1016/S2214-109X(15)00050-9)  
See [Articles](#) page e470

and Bharadwaj P, unpublished) should also make it a top priority for the global health community.

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We declare no competing interests.

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